

CLAIMS

What is claimed is:

- 5           1.       A robotic domain reflectometry test system comprising:
- domain reflectometry instrumentation;
- a robotic arm; and
- a passive, high frequency probe assembly comprising a signal probe and a
- 10           ground probe having a fixed, non-adjustable pitch, said probe assembly being electrically connected to
- said domain reflectometry instrumentation, and being moved, electrically connected to, and retracted
- from test points on an electrical component to be tested by said robotic arm.
2.       The system of claim 1 additionally comprising a second robotic arm and a second
- 15           passive, high frequency probe assembly having a fixed, non-adjustable pitch and being electrically
- connected to said domain reflectometry instrumentation, and being moved, electrically connected to, and
- retracted from test points on the electrical component to be tested by said second robotic arm, whereby
- differential domain reflectometry tests may be performed on the electrical component.
3.       The system of claim 1 wherein said probe assembly comprises a second signal probe
- 20           and a second ground probe having a fixed, non-adjustable pitch, whereby differential domain
- reflectometry tests may be performed on the electrical component.
4.       The system of claim 1 additionally comprising a probe assembly changing station
- 25           accessible by said robotic arm, said probe assembly changing station comprising holders for a plurality
- of probe assemblies.

5. The system of claim 4 additionally comprising a robotic control system comprising means for directing said robotic arm to acquire from said probe assembly changing station a probe assembly having a correct pitch for testing of test points of the electrical component having a same pitch.

6. The system of claim 1 additionally comprising a calibration/verification station accessible by said robotic arm and comprising a calibrated airline.

7. The system of claim 1 wherein said system can test traces having a length of between approximately 0.5 inches and 150 feet such that a standard deviation of domain reflectometry test result impedances is 0.03 ohms or less.

8. The system of claim 1 wherein said probe assembly mimics electrical characteristics of a coaxial structure.

9. The system of claim 1 wherein said system can test components comprising dimensions of between approximately 5.25 inches x 0.5 inches and 36 inches x 28.5 inches.

10. The system of claim 1 additionally comprising a robotic control system comprising means for automatically planning testing of the electrical component by importation of computer aided design data for the electrical component.

11. The system of claim 1 wherein said system records impedance and propagation delay and calculates a dielectric constant for each test point of the electrical component.

12. A probe assembly changing station for a robotic domain reflectometry test system, said station being accessible by a robotic arm of said system, and said station comprising holders for a plurality of passive, high frequency probe assemblies affixable to an end of the robotic arm and from which the robotic arm can without human intervention affix any of the plurality of probe assemblies.

13. The probe assembly changing station of claim 12 wherein each of said probe assemblies comprises a passive, high frequency probe assembly comprising a signal probe and a ground probe having a fixed, non-adjustable pitch.

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14. A robotic domain reflectometry test system comprising:  
differential domain reflectometry instrumentation;  
at least one robotic arm; and  
two passive, high frequency probe assemblies each comprising a signal probe,  
each said probe assembly being electrically connected to said differential domain reflectometry  
instrumentation, and being moved, electrically connected to, and retracted from test points on an  
electrical component to be tested by said at least one robotic arm.

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15. The system of claim 14 wherein said at least one robotic arm comprises a single robotic  
arm holding both said probe assemblies.

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16. The system of claim 14 wherein said at least one robotic arm comprises two robotic arms  
each holding one of said probe assemblies.

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17. The system of claim 14 wherein at least one of said probe assemblies additionally  
comprises a ground probe having a fixed, non-adjustable pitch with respect to said signal probe on said  
at least one of said probe assemblies.

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18. The system of claim 17 wherein both of said probe assemblies additionally comprise a  
ground probe having a fixed, non-adjustable pitch.

19. A robotic domain reflectometry test system comprising:

domain reflectometry instrumentation;

a robotic arm;

a passive, high frequency probe assembly comprising a signal probe and a

5 ground probe, said probe assembly being electrically connected to said domain reflectometry instrumentation, and being moved, electrically connected to, and retracted from test points on an electrical component to be tested by said robotic arm; and

means for recording impedance and propagation delay for each test of the test points and means for calculating and recording a dielectric constant for each test of the test points.

10 20. A robotic domain reflectometry test system comprising:

domain reflectometry instrumentation;

a robotic arm; and

a passive, high frequency probe assembly comprising a signal probe and a

15 ground probe, said probe assembly being electrically connected to said domain reflectometry instrumentation, and being moved, electrically connected to, and retracted from test points on an electrical component to be tested by said robotic arm; and

20 wherein said system can test traces having a length of between approximately 0.5 inches and 150 feet such that a standard deviation of domain reflectometry test result impedances is 0.03 ohms or less.

21. A robotic domain reflectometry test system comprising:

domain reflectometry instrumentation;

a robotic arm;

a passive, high frequency probe assembly comprising a signal probe and a

5 ground probe, said probe assembly being electrically connected to said domain reflectometry instrumentation, and being moved, electrically connected to, and retracted from test points on an electrical component to be tested by said robotic arm; and

a calibration/verification station accessible by said robotic arm and comprising a calibrated airline.

22. The system of claim 20 wherein said calibrated airline is selected from the group consisting of 28 ohm and 50 ohm NIST calibrated airlines.

23. A robotic domain reflectometry test method comprising the steps of:

providing to a robotic arm a passive, high frequency probe assembly comprising a signal probe and a ground probe having a fixed, non-adjustable pitch, the probe assembly being electrically connected to domain reflectometry instrumentation; and

with the robotic arm moving the probe assembly proximate to, electrically connecting the probe assembly to, and retracting the probe assembly from test points on an electrical  
20 component to be tested.

24. A robotic domain reflectometry test method comprising the steps of:

providing within reach of a robotic arm a probe assembly changing station comprising holders for a plurality of passive, high frequency probe assemblies;

25 without human intervention affixing to an end of the robotic arm any one of the plurality of probe assemblies.

25. A robotic domain reflectometry test method comprising the steps of:

providing to at least one robotic arm two passive, high frequency probe assemblies each comprising a signal probe;

electrically connecting the two probes to differential domain reflectometry

5 instrumentation; and

with the at least one robotic arm moving the two probe assemblies proximate to, simultaneously electrically connecting the two probe assemblies to, and retracting the two probe assemblies from test points on an electrical component to be tested.

10 26. A robotic domain reflectometry test method comprising the steps of:

providing to a robotic arm a passive, high frequency probe assembly comprising a signal probe and a ground probe, the probe assembly being electrically connected to domain reflectometry instrumentation;

15 with the robotic arm moving the probe assembly above, electrically connecting the probe assembly to, and retracting the probe assembly from test points on an electrical component to be tested; and

recording impedance and propagation delay for each test of the test points and calculating and recording a dielectric constant for each test of the test points.

27. A robotic domain reflectometry test method comprising the steps of:

providing to a robotic arm a passive, high frequency probe assembly comprising a signal probe and a ground probe, the probe assembly being electrically connected to domain reflectometry instrumentation;

5 with the robotic arm moving the probe assembly proximate to, electrically connecting the probe assembly to, and retracting the probe assembly from test points on an electrical component to be tested; and

testing traces of the electrical component having a length of between approximately 0.5 inches and 150 feet such that a standard deviation of domain reflectometry test result impedances is 0.03 ohms or less.

28. A robotic domain reflectometry test system comprising the steps of:

providing to a robotic arm a passive, high frequency probe assembly comprising a signal probe and a ground probe, said probe assembly being electrically connected to domain reflectometry instrumentation;

15 with the robotic arm moving the probe assembly proximate to, electrically connecting the probe assembly to, and retracting the probe assembly from test points on an electrical component to be tested; and

employing a calibration/verification station accessible by the robotic arm and comprising a calibrated airline.

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